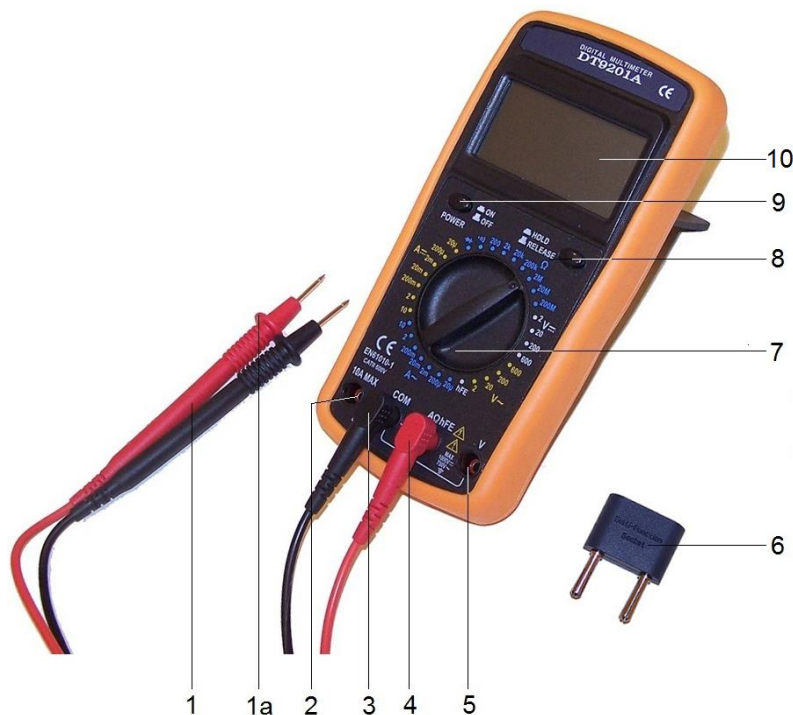


Digital Multimeter E 1018832

Instruction sheet

12/19 SD/UD



- 1 Measuring probe
- 1a Finger guards
- 2 Measurement socket "10 A" for current measurement in 10-A range (positive)
- 3 Measurement socket "COM" (negative)
- 4 Measurement socket "A/Ω/hFE" for resistance and current measurement for up to 2 A (positive)
- 5 Measurement socket "V" for voltage measurement (positive)
- 6 Adapter for transistor test
- 7 Measurement range dial
- 8 Hold function button
- 9 On/Off switch
- 10 Display



1. Safety instructions/using the equipment safely

Digital multimeter E conforms to safety regulations for electrical measurement, control and laboratory equipment, as specified in DIN EN 61010-1, protection class 2 and to excess voltage category CAT I for up to 600 V. It is intended for measurements on experiments and laboratory apparatus. It is not approved for measurements on low-voltage mains distribution equipment, such as sockets, fuses, etc.

The meter is intended for measurements within its measuring ranges and in a measuring environment as described in detail in the course of this manual. Safe operation of the multimeter is guaranteed if it is solely used as specified. Safety cannot be guaranteed, however, if the multimeter is used incorrectly or handled without due care and attention.


In order to avoid serious injury due to current or voltage shocks, the following safety instructions are to be observed at all times.

The multimeter may only be used by persons who are able to recognise the risks of contact and take due precautions to avoid them. Voltages in excess of 33 V AC (RMS) or 70 V DC are to be regarded as actively dangerous if the current, charge or energy stored should exceed certain values (see DIN EN 61010-1).

- Carefully read the instruction manual before using the multimeter and obey the instructions therein.
- The multimeter may only be used in a dry, dust-free environment with no risk of explosions occurring.

The assumption needs to be made that unforeseen voltages may be present in the vicinity of objects being measured (e.g. faulty equipment).

- Before using the multimeter, check the housing and measuring leads for damage and if there should be any malfunctions or visible damage, the multimeter is not to be used. Pay specific attention to the insulation for the measuring sockets.
- The multimeter may not be used to make measurement on circuits which exhibit corona discharge (high voltage).
- Particular care is to be taken when making measurements on high-frequency circuits where dangerous voltages may arise due to superimposition of components.
- The authorised measuring range is not to be exceeded. If measurements are made when the magnitude of the variable is unknown, always select a large measuring range before shifting down to lower ones.
- Make very sure that the voltage value between the measured contact and earth or between the ground socket and the measurement socket does not exceed 600 V.
- Before using the multimeter to check that a voltage source is not exhibiting any actual voltage, check that the meter is working properly by selecting the battery test function.
- When measuring current, make sure the electricity is turned off before the multimeter is connected into the circuit.
- When making measurements, always connect the ground lead first. Disconnect the signal measurement lead before unplugging the ground.
- Turn off the multimeter before opening the casing, disconnect the power to the circuit and the measuring leads from the multimeter.
- If measurements are made where there are any risks of coming into contact with electricity, a second person is to be informed.
- The multimeter should not be stored, set up or operated within reach of children.
- When the multimeter is used by teenagers, trainees etc., a suitable person should supervise to ensure the equipment is used safely.
- If measurements are to be made where voltages exceed 33 V AC (RMS) or 70 V DC, be especially careful and only use safety experiment leads.
- When using the measuring leads always hold them with your fingers behind the finger guard.

- To avoid false readings, which may result in electric shocks or injuries, always replace the battery as soon as the flat battery indicator () is displayed.
- Never use the multimeter when its casing is open.








Measuring categories according to DIN EN 61010-1.

- CAT I or unstipulated: Approved for measurements in circuits which are not directly connected to the low voltage mains grid (e.g. batteries).
- CAT II: Approved for measurements in circuits which are directly connected, by a mains lead and plug for instance, to the low voltage mains grid (e.g. household or office appliance and lab equipment).
- CAT III: Approved for measurements in circuits which are part of a building's wiring installation (e.g. stationary consumers, distribution terminals, appliances connected directly to the distribution box).
- CAT IV: Approved for measurements in circuits which are directly connected to the source of the low voltage mains (e.g. electricity meters, main service feed, primary excess voltage protection).

2. Equipment supplied

- 1 Digital multimeter
- 1 Pair of measuring probes
- 1 Adapter for transistor test
- 1 Battery
- 1 Instruction manual


3. Symbol legend

-  Hazard, read instruction sheet
-  Dangerous voltages
- V**  DC voltage
- A**  DC current
- V**  AC voltage
- A**  AC current
-  Diode and continuity test
- hFE** Current amplifying factor of a transistor

Ω Resistance

 Flat battery

CAT Measuring category as per IEC EN 61010-1

 Double insulated casing

CE EU conformity mark

 Earth symbol

4. Technical data

Dimensions: 90x190x35 mm approx.
Weight: 310 g approx. (with battery)
Display: 3½-digit LCD, 24 mm, max. 1999
Operating voltage: 9-V battery, 6F22
Fuse: F 2 A / 600 V
F10 A / 600 V
Connectors: 4-mm safety sockets
Measurements/second: 2 – 3 times
Overload display: "1" shown on display
Overload protection:
Voltage limits: 1000 V DC or 750 V AC long-term in all voltage ranges
Current limits:
2 A range: max. 2 A
10 A range: max. 10 A for 10 s with minimum interval 15 mins
Operating temperature: 0°C – 40°C with 0 – 75% humidity
Storage temperature: -10°C – 50°C with 0 – 75% humidity
Electrical safety:
Safety specifications: EN 61010-1
Excess voltage category: CAT I: 600 V
Contamination level: 2
Protection type: IP20
Electromagnetic compatibility:
Interference emission: EN 55011:2009
Interference resistance: EN 61326-1:2013

V DC		
Measuring range	Resolution	Accuracy
2 V	1 mV	±(0.8% + 5 digits)
20 V	10 mV	
200 V	100 mV	
600 V	1 V	±(1.0% + 5 digits)

Input impedance: 10 M Ω

V AC		
Measuring range	Resolution	Accuracy
2 V	1 mV	±(1.0% + 5 digits)
20 V	10 mV	
200 V	100 mV	
600 V	1 V	±(1.2% + 5 digits)

Input impedance: 10 M Ω

Frequency range: 40 – 400 Hz

A DC		
Measuring range	Resolution	Accuracy
20 μ A	10 nA	±(1.8% + 2 digits)
200 μ A	100 nA	
2 mA	1 μ A	
20 mA	10 μ A	±(2.0% + 2 digits)
200 mA	100 μ A	
2 A	1 mA	±(2.0% + 10 digits)
10 A	10 mA	

Measuring voltage drop: 200 mV

A AC		
Measuring range	Resolution	Accuracy
20 μ A	10 nA	±(2.0% + 5 digits)
200 μ A	100 nA	±(2.0% + 3 digits)
2 mA	1 μ A	
20 mA	10 μ A	
200 mA	100 μ A	±(2.0% + 5 digits)
2 A	1 mA	±(2.0% + 10 digits)
10 A	10 mA	

Measuring voltage drop: 200 mV

Frequency range: 40 – 400 Hz

Ω		
Measuring range	Resolution	Accuracy
200 Ω	0,1 Ω	±(1.0% + 10 digits)
2 kΩ	1 Ω	±(1.0% + 4 digits)
20 kΩ	10 Ω	
200 kΩ	100 Ω	
2 MΩ	1 kΩ	±(1.0% + 10 digits)
20 MΩ	10 kΩ	
200 MΩ	100 kΩ	±(5.0% + 10 digits)

Accuracy is given for 1 year after calibration at 23°C ±5°C, RH<75%.

5. Description

Digital multimeter E is a robust, battery operated multimeter with a 3½-digit LCD display for measuring voltage, current and resistance as well as for diode and hFE gain testing.

All measurement ranges are selected by means of a rotary dial. All measurement ranges are protected against overload.

The meter is equipped with a hold function, negative polarity indication, over range indication and low battery indication.

On the backside there is a fold out prop for standing the device on a table.

6. Operation

Note: The multimeter switches into an indeterminate state if the Hold button is activated (Hold function button (8) pressed). After it is switched on, the display will then show "1.666" (where the position of the decimal point is dependent on the selected measuring range). If this case should arise, deactivate the Hold function while the equipment is switched on (deactivate Hold function by pressing the button one more time).

6.1 Method of measurement



Warning! Dangerous voltages may be present at the input terminals and may not be displayed.

6.1.1 Voltage measurement

- Set the measurement range dial at the required position $V_{\text{---}}$ or $V_{\text{~}}$.
- Connect the black test lead to the measurement socket "COM" and the red test lead to the "V" socket. The meter is connected parallel to the measuring point. The polarity of the red lead connection will be indicated at the same time as the voltage when making a DC measurement.

Note

- If the voltage to be tested is unknown beforehand, set the measurement range dial to the highest range and work down.
- When only the figure "1" is displayed, over range is being indicated and the measurement range dial has to be set to a higher range.
- Never measure voltages higher than 600 V.

6.1.2 Current measurement

- Set the measurement range dial at the required position $A_{\text{---}}$ or $A_{\text{~}}$.
- Connect the black test lead to the measurement socket "COM" and the red test lead to the "A/Ω/hFE" socket for measurements up to 2 A. For measurements over 2 A connect it to the socket "10 A". The meter is connected in series to the measuring object. The polarity of the red lead connection will be indicated at the same time as the current when making a DC measurement.

Note

- If the current to be tested is unknown beforehand, set the measurement range dial to the highest range and work down.
- When only the figure "1" is displayed, over range is being indicated and the measurement range dial has to be set to a higher range.
- Limit measurements in the 10-A range to max. 10 s.

6.1.3 Resistance measurement



Warning! To avoid electrical shock or damage to the meter when measuring resistance in a circuit, make sure the power to the circuit is turned off and all capacitors are discharged.

- Set the measurement range dial to the Ω range.
- Connect the black test lead to the measurement socket "COM" and the red test lead to the "A/ Ω /hFE" socket. Measurement is done parallel to the resistor

Note

- If the resistance to be tested is unknown beforehand, set the measurement range dial to the highest range and work down. When only the figure "1" is displayed, over range is being indicated and the measurement range dial has to be set to a higher range.

When the input is not connected, i.e. at open circuit, the figure "1" will be displayed for the over range condition.

6.1.4 Diode test

- Set the measurement range dial to $\rightarrow|+$.
- Connect the black test lead to the measurement socket "COM" and to the cathode of the diode. Connect the red test lead to the "A/ Ω /hFE" socket and the anode of the diode.

Note: The meter displays the forward voltage drop and displays figure "1" for overload when the diode is reversed.

6.1.5 Continuity test



Warning! To avoid electrical shock or damage to the meter when measuring continuity in a circuit, make sure the power to the circuit is turned off and all capacitors are discharged.

- Set the measurement range dial to $\rightarrow|)$.
- Connect the black test lead to the measurement socket "COM" and the red test lead to the "A/ Ω /hFE" socket.

A built-in buzzer sounds if the resistance is less than $30 \pm 10 \Omega$.

6.1.6 Transistor hFE test

- Set the measurement range dial to **hFE**.
- Insert the adapter for transistor test into the measurement sockets "COM" and "A/ Ω /hFE".
- Make sure the transistor is "NPN" or "PNP" type. Insert the transistor correctly into the corresponding transistor test socket.

Display reading is approx. transistor hFE value (0 – 1000). Base current approx. 10 μ A, V_{CE} approx. 2.8 V.

7. Maintenance




Turn off the meter and remove the test leads before you service or clean the device.

Beyond replacing batteries and fuses, do not attempt to repair or service your meter unless you are qualified to do so and have the relevant calibration, performance test, and service instructions.

7.1 Battery and fuse replacement

Batteries which are discharged and have not been used for a while may leak.



Replace the battery as soon as the flat battery icon () appears.



Remove from the multimeter any batteries which are flat or starting to disintegrate.



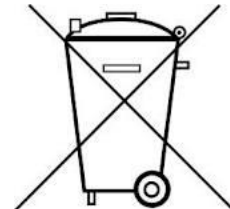
Also remove batteries from the multimeter if it has not been used for a long period of time.



Turn off the meter and remove the test leads before opening the case.

- Loosen screws with suitable screwdriver and remove case bottom.
- Replace the battery or the fuse.
- Replace the case bottom and reinstall the three screws. Never operate the meter unless the case bottom is fully closed.

- Do not dispose of the battery in regular household refuse. Follow the local regulations (In Germany: BattG; EU: 2006/66/EG).



7.2 Cleaning

- Periodically wipe the case with a damp cloth and mild detergent.
- Do not use abrasives or solvents.

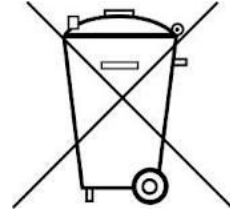
Dirt or moisture in the measurement sockets can affect readings.

- Shake out any dirt that may be in the measurement sockets.
- Soak a new swab with isopropyl alcohol and work around the inside of each measurement socket.

8. Disposal

- The packaging should be disposed of at local recycling points.

- Should you need to dispose of the equipment itself, never throw it away in normal domestic waste. Local regulations for the disposal of electrical equipment will apply.



- Do not dispose of the battery in regular household refuse. Follow the local regulations (In Germany: BattG; EU: 2006/66/EG).